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EDITOR

Studies on Influenza

By Monroe D. Eaton, M.D., Research Laboratory, Rockefeller Foundation, Berkeley

During 1940 two epidemics of influenza occurred in California; a small epidemic in January and February, and a relatively large one in November and December. Serum specimens from 429 cases collected during the first epidemic all gave negative or doubtful reactions for influenza A, the type of influenza which is caused by the virus discovered by Smith, Andrewes and Laidlaw in 1933. Likewise, throat washings from a number of cases failed to cause any significant temperature response or other symptoms after intranasal inoculation into ferrets.

At that time it was concluded that the influenza which occurred during January and February, although clinically indistinguishable from influenza A, was a disease of unknown etiology. Similar influenza epidemics not due to the type A virus had been described by other workers. A rather extensive outbreak not due to the type A virus occurred in the Southeastern States from October, 1939, to January, 1940. In November, 1940, there appeared in Science an article by Dr. Thomas Francis Jr., Professor of Bacteriology at New York University, describing the isolation of a new virus from cases of epidemic influenza. This new virus was termed the virus of influenza B and was found to be antigenically distinct from the virus of influenza A. Subsequently, the strain isolated by Dr. Francis from a case in New York was sent to our laboratory. Acute and convalescent serum specimens from about 70 of the cases in the winter epidemic in California had been kept in storage and when these were tested with the virus of influenza B approximately 60 per cent were found to be positive. It was also found that a California strain of the virus had been successfully transmitted from human beings to ferrets and carried through twelve ferret-passages without the development of symptoms or pathology definite enough to positively indicate the presence of an infectious agent. However, ferrets inoculated with material from the eleventh ferret in the series developed antibodies to the New York strain of influenza B, thus indicating that they had been infected with a related virus.

Tests done in the New York laboratories on serum specimens from cases in the epidemic of late 1939 in the Southeastern States indicate that the etiology was also influenza B. It appears, therefore, that the disease had spread north and west from that area and had reached California by January, 1940.

Since extensive epidemics of influenza A had occurred in 1933 and 1937, it appeared reasonable to expect another epidemic of influenza A in the United States in 1941. The disease arrived on schedule, but this time it was first detected at some distance from the mainland. Influenza A was found in an epidemic which occurred in the Carribean area in July and August. In October an extensive epidemic occurred in the Hawaiian Islands and specimens from cases in this epidemic were tested at the California State Health Department's Influenza Laboratory. About 75 per cent were found positive for influenza A, and about 5 per cent positive for influenza B.

In mid-November, cases of influenza were reported to the Bureau of Epidemiology from Fort Bragg, San Francisco, Madera County and from southern California. Serum specimens from cases in the first three localities named were positive for influenza A and the appearance of the disease in widely separated foci in California was thus established. Presumably these foci were started by infection from persons coming from the Hawaiian Islands, but this can not be proved because of the great difficulty of detecting influenza carriers. Later the disease spread to all parts of the State, affecting 5 to over 20 per cent of the population in various regions. In December influenza appeared in Oregon, Washington, Idaho, Arizona, and New Mexico. The eastward trend of the epidemic during January appeared to be somewhat spotty, but preliminary reports suggested that the disease had reached the Atlantic Coast.

Serum specimens from over 400 cases in the California epidemic have been studied to date. The proportion of cases positive for influenza A varied from 50 to 95 per cent in the several groups studied. Throat washings from cases in Hawaii and California produced definite temperature reactions and sypmtoms of influenza A in ferrets in about 50 per cent of the tests. Only one case of influenza B has been found so far in the series from the recent epidemic.

The California epidemic afforded the first opportunity to test a new complex influenza-distemper vaccine developed by Drs. Horsfall and Lennette at the Rockefeller Institute for Medical Research. Results which appear significant were obtained at two State prisons where 829 persons out of a total population of 7,900 had been vaccinated before the peak of the epidemic.* Approximately half of the group vaccinated received the complex vaccine. The other half was inoculated subcutaneously with a simple chick embryo tissue culture of active influenza virus (strain Melbourne) prepared in the California laboratory. No significant reactions were observed in persons inoculated with either vaccine. The results are presented in the tables below. At one prison where approximately 50 per cent of the cases of febrile respiratory disease gave positive serological reactions for influenza A, the incidence of clinical influenza was 6.3 per cent in the group receiving the formalinized complex vaccine and 8.8 per cent in the group receiving the simple active virus as compared with 8.2 per cent in the control group not vaccinated. At the other prison where approximately 90 per cent of the cases tested were positive for influenza A, the incidence of acute febrile respiratory disease was 7.4 per cent in the group receiving the formalinized complex vaccine, 5.9 per cent in the group inoculated with the simple active virus, and 14.9 per cent in the unvaccinated group. Over three thousand persons on hospital staffs, in army camps, medical schools, and various other groups were inoculated with the complex vaccine, but it appeared that the results on these would be inconclusive because the vaccinations were started during the epidemic.

Both vaccines appeared to be more effective at Folsom Prison than at San Quentin because (1) about 90 per cent of the cases at Folsom were caused by the type A virus while only 50 per cent of the patients at San Quentin had this type of the disease, (2) the much higher incidence of influenza A at Folsom afforded a better test, and (3) a longer period of time elapsed between the completion of the vaccinations and the peak of the epidemic at Folsom.

Because of the small group vaccinated, these findings can not be considered conclusive, but they may indicate the trend of the results of many more tests which will be made in other parts of the United States during this winter.

FOLSOM

Cases Recorded	Total	401
Vaccination completed	12- 3-40	
Cases recorded	12- 8-40 to 12-28-40	
Peak of epidemic	12-17-40	

Cases Recorded by Complement Fixation Influenza A

	Pos. C. F.	*Neg. C. F.*
Total 26	24 (92%)	2 (8%)

Vaccination	*Total Vaccinated*	*Cases* **	*Incidence*
V1 *	169	10	5.9%
V2 *	244	18	7.4%
Total	413	28	6.8%

Morbidity in Control Group Not Vaccinated

Total Personnel	2487		
Cases		373	14.9%

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* These studies were done by Dr. W. P. Martin in collaboration with Dr. L. L. Stanley, prison physician at San Quentin, and Dr. P. W. Day, prison physician at Folsom.

* V1—Active Melbourne tissue culture.
V2—Complex Distemper-Influenza vaccine lot 109.

** Cases occurring more than 10 days after vaccination.

SAN QUENTIN

Cases Recorded	Total 402
Vaccination completed	11-29-40
Cases recorded	12- 3-40 to 12-26-40
Peak of epidemic	12- 6-40 to 12-10-40

Cases Recorded by Complement Fixation Influenza A

Total 44

Results	*Pos. C.F.*	*Doubt. C.F.*	*Neg. C.F.*
Non. Vacc.	12	2	10
V1 *	7		4
V2 *	4	1	4
Total	23 (52%)	3 (7%)	18 (41%)

Vaccination	*Total Vaccinated*	*Cases* **	*Incidence*
V1 *	193	17	8.8%
V2 *	223	14	6.3%
Total	416	31	7.4%
Morbidity in Control Group Not Vaccinated			
Total Personnel	4500		
Cases		371	8.2%

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* V1—Active Melbourne tissue culture.
V2—Complex Distemper-Influenza vaccine lot 109.
** Cases occurring more than ten days after vaccination.

PHYSICAL EXAMINATIONS OF N. Y. A. EMPLOYEES

During the month, 41 enrollees of the National Youth Administration in the Sacramento area were given complete physical examinations by a medical officer of the Industrial Hygiene Service. Since October 28, 1940, 82 N. Y. A. employees have been examined. Of this number, 36, or 44 per cent, were found to have remedial physical defects, such as carious teeth, defective vision, and hernias, and were referred to local private physicians and to the County Hospital for treatment.

These examinations are directly related to the National Preparedness Program, since many of the youths examined are being trained for positions as machinists, welders, and other highly skilled trades in which there is a great shortage of workers in the defense industries. Intelligent placement of these youths in the type of work for which they are best fitted physically, and the diagnosis and treatment of illnesses and defects in their early stages, can be accomplished more effectively on the basis of thorough preemployment and periodic physical examinations.

REVISED LIST OF REPORTABLE DISEASES

Reportable Only:

- Anthrax
- Botulism—if commercial product notify State Department of Health at once.
- Coccidioidal Granuloma
- Dengue—keep patient in mosquito free room.
- Epilepsy
- Food Poisoning
- Glanders—report by phone or telegraph.
- Jaundice—infectious or epidemic types.
- Malaria—keep patient in mosquito free room.
- Pneumonia—specify type of pneumococcus, if known.
- Relapsing fever
- Rocky Mountain Spotted Fever
- Tetanus
- Trichinosis
- Tularemia
- Undulant fever

Reportable and Subject to Isolation:

- Epidemic diarrhea of the newborn (in institutions)
- Chickenpox
- Dysentery—Amoebic
- Dysentery—Bacillary—specify type, if known.
- German Measles
- Influenza
- Measles
- Mumps
- Ophthalmia Neonatorum
- Psittacosis
- Rabies—in animals. Use special card.
- Rabies—in humans.
- Septic Sore Throat (in epidemic form).
- Trachoma
- Tuberculosis—use special card.
- Whooping Cough
- Syphilis—use special card.
- Gonorrhea—use special card.
- Chancroid—use special card.
- Lymphopathia Venereum—use special card.
- Granuloma inguinale—use special card.

Reportable and Subject to Quarantine and Placarding:

- Cholera—report by telephone or telegraph to State Department of Health.
- Diphtheria
- Encephalitis (Infectious)—specify type, if known.

  NOTE: This means all forms of acute encephalitis such as St. Louis type, equine type, and any other epidemic form occurring in California.

- Leprosy
- Meningitis (due to the meningococcus).
- Paratyphoid Fever—specify type A or B.
- Plague—report by telephone or telegraph to State Department of Health.
- Acute Anterior Poliomyelitis
- Scarlet Fever
- Smallpox
- Typhoid Fever
- Typhus Fever
- Yellow Fever—report by telephone or telegraph to State Department of Health.

MORBIDITY

Complete Reports for Following Diseases for Week Ending January 25, 1941

Chickenpox

868 cases: Alameda County 1, Albany 2, Berkeley 9, Oakland 28, Contra Costa County 1, Pittsburg 1, Fresno County 3, Fresno 12, Reedley 1, Sanger 1, Eureka 9, Kern County 18, Bakersfield 7, Kings County 64, Los Angeles County 62, Claremont 1, Compton 2, Covina 1, Culver City 1, El Monte 1, El Segundo 10, Glendale 7, Hermosa 2, Huntington Park 1, Long Beach 10, Los Angeles 53, Monrovia 1, Montebello 2, Pasadena 7, Pomona 5, Santa Monica 5, South Pasadena 1, Lynwood 1, South Gate 25, Monterey Park 1, Maywood 1, Madera County 2, Marin County 1, Merced County 10, Gustine 2, Monterey County 11, Monterey 2, Orange County 6, Anaheim 2, Fullerton 9, Orange 5, Santa Ana 14, La Habra 3, Tustin 1, Placer County 24, Riverside County 11, Corona 8, Riverside 1, Palm Springs 2, Sacramento 42, Ontario 2, San Bernardino 5, San Diego County 2, Escondido 1, National City 1, San Diego 59, San Francisco 104, San Joaquin County 22, Lodi 2, Stockton 14, Tracy 2, Paso Robles 5, San Mateo County 1, Burlingame 2, Menlo Park 2, Santa Barbara County 9, Lompoc 3, Santa Barbara 1, Santa Maria 6, Santa Clara County 10, Palo Alto 22, San Jose 7, Shasta County 1, Siskiyou County 4, Yreka 14, Sonoma County 10, Santa Rosa 1, Stanislaus County 6, Modesto 4, Sutter County 6, Tulare County 12, Exeter 3, Sonora 1, Santa Paula 1, Yolo County 2, Winters 2, Woodland 3, Yuba County 2, California 1.*

Diphtheria

18 cases: Butte County 1, Brawley 1, Los Angeles County 3, Los Angeles 3, Whittier 1, Santa Ana 1, Riverside County 1, Sacramento 4, San Joaquin County 1, Stockton 1,Sutter County 1.

German Measles

147 cases: Alameda County 1, Berkeley 1, Livermore 1, Oakland 2, Pleasanton 1, Lassen County 1, Susanville 80, Los Angeles County 1, Compton 1, Long Beach 20, Los Angeles 2, Pasadena 2, Monterey County 1, Orange County 2, Anaheim 1, Tustin 1, Riverside County 1, Ontario 1, San Diego County 2, Escondido 3, San Diego 4, San Francisco 6, Stockton 1, San Luis Obispo 1, Burlingame 1, San Mateo 1, Santa Clara County 4, Siskiyou County 2, Benicia 1.

Influenza

1428 cases: Alameda County 2, Berkeley 12, Oakland 5, Fresno 1, Kern County 110, Bakersfield 1, Delano 5, Los Angeles County 528, Alhambra 303, Arcadia 4, Claremont 6, Compton 2, El Segundo 6, Glendale 2, Glendora 1, Huntington Park 1, Long Beach 3, Los Angeles 170, Manhattan 1, Montebello 1, Pasadena 9, Santa Monica 1, Lynwood 2, Hawthorne 1, West Covina 1, South Gate 1, Madera County 21, Marin County 2, Mill Valley 2, Merced County 2, Salinas 1, Napa County 10, Orange County 12, Santa Ana 2, La Habra 3, Placer County 20, Riverside 2, Palm Springs 2, Sacramento 9, Hollister 1, San Bernardino County 18, San Diego 3, San Francisco 19, San Joaquin County 12, San Luis Obispo 5, San Mateo 25, San Jose 1, Sonoma County 37, Petaluma 2, Santa Rosa 5, Stanislaus County 8, Ventura 3, Yolo County 6.

Malaria

3 cases: Oakland 1.

Measles

104 cases: Oakland 1, Fresno County 1, Kern County 8, Bakersfield 11, Kings County 1, Lassen County 1, Susanville 8, Burbank 1, Compton 1, Huntington Park 1, Long Beach 1, Los Angeles 4, Monterey 1, Napa County 1, Napa, 3, Orange County 1, Fullerton 1, Huntington Beach 1, Redlands 1, San Diego 6, Stockton 1, Paso Robles 1, Santa Barbara County 6, Santa Barbara 1, Santa Maria 1, Santa Clara County 2, Santa Cruz 8, Shasta County 1, Vacaville 3, Stanislaus County 1, Yolo County 1.

Mumps

310 cases: Alameda County 1, Berkeley 1, Oakland 7, Contra Costa County 3, Fresno County 2, Kern County 9, Bakersfield 1, Delano 17, Los Angeles County 50, El Segundo 4, Glendale 4, Huntington Park 1, Inglewood 1, Long Beach 17, Los Angeles 27, Monrovia 1, Pomona 4, Maywood 1, Bell 1, Monterey County 1, Salinas 1, Grass Valley 12, Orange County 10, Fullerton 3, Huntington Beach 7, Orange 1, Santa Ana 1, Seal Beach 3, La Habra 1, Laguna Beach 1, Riverside County 6, Blythe 4, Corona 5, Elsinore 2, Indio 5, Chino 2, San Diego County 1, La Mesa 1, San Diego 9, San Francisco 12, San Jose 4, Santa Cruz County 6, Santa Cruz 1, Shasta County 18, Siskiyou County 6. Solano County 13, Sonoma County 9, Stanislaus County 1, Tehama County 1, Tulare County 3, Visalia 1, Ventura County 1, Fillmore 1, Santa Paula 1, Ventura 3, Winters 1.

Pneumonia (Lobar)

66 cases: Oakland 1, Coalinga 1, Reedley 1, Kern County 2, Kings County 2, Los Angeles County 6, Long Beach 5, Los Angeles 19, Pasadena 1, Pomona 2, Redondo 1, Orange County 3, Santa Ana 1, Sacramento 2, Redlands 1, San Diego 2, San Francisco 6, Lodi 2, Santa Barbara 1, San Jose 1, Sonoma County 2, Modesto 1, Ventura County 1, Yolo County 1, Winters 1.

Scarlet Fever

151 cases: Berkeley 1, Oakland 5, Butte County 1, Fresno County 8, Fresno 1, Sanger 2, Kern County 11, Kings County 3, Los Angeles County 18; Alhambra 1, Azusa 1, Burbank 2, Compton 3, El Monte 1, Glendale 1, Hermosa 1, Long Beach 1, Los Angeles 27, Monrovia 1, Pasadena 2, Santa Monica 1, Torrance 1, Lynwood 5, South Gate 3, Maywood 2, Gardena 1, Orange County 1, Santa Ana 1, Seal Beach 1, Riverside 2, Sacramento 7, Ontario 3, Redlands 1, San Bernardino 1, National City 1, San Diego 11, San Francisco 1, Stockton 1, San Luis Obispo County 5, Santa Barbara 1, Santa Clara County 1, Tulare County 3, Visalia 1, Ventura County 1, Fill-County 1, Tehama County 1, Santa Paula 1.

Smallpox

One case: Willows.

Typhoid Fever

No cases reported.

Whooping Cough

365 cases: Alameda County 1, Alameda 7, Albany 2, Berkeley 4, Oakland 31, Butte County 3, Contra Costa County 4, Fresno County 2, Kern County 2, Lakeport 2, Los Angeles County 46, Burbank 1, Compton 1, Glendale 3, Long Beach 13, Los Angeles 48, Montebello 3, Pasadena 16, Redondo 1, San Fernando 2, Santa Monica 1, Whittier 2, Torrance 1, South Gate 2, Chowchilla 1, Monterey County 2, Orange County 4, Huntington Beach 1, Newport Beach 4, Orange 4, Santa Ana 10, La Habra 3, Laguna Beach 2, Tustin 1, Riverside County 2, Corona 3, Sacramento 1, San Bernardino County 2, Redlands 1, San Bernardino 8, San Diego County 8, San Diego 32, San Francisco 41, San Joaquin County 1, Stockton 1, San Luis Obispo County 5, San Luis Obispo 15, San Mateo County 4, Santa Barbara County 2, Santa Barbara 1, Santa Clara County 2, San Jose 1, Solano County 1, Sonoma County 1, Petaluma 2, Fillmore 1.

Meningitis (Epidemic)

2 cases: Los Angeles 1, Stanislaus County 1.

Dysentery (Amoebic)

4 cases: Kern County 1, Kings County 2, Burlingame 1.

Dysentery (Bacillary)

5 cases: Los Angeles County 2, Los Angeles 1, San Francisco 1, San Jose 1.

Poliomyelitis

3 cases: Imperial County 1, Los Angeles 1, Riverside 1.

Trachoma

9 cases: Whittier 5, Mendocino County 1, Santa Ana 1, Sacramento 1, California 1.*

Encephalitis (Epidemic)

One case: San Benito County.

Paratyphoid Fever

One case: Santa Clara County.

Trichinosis

3 cases: Santa Maria 1, Sonoma County 2.

Botulism

3 cases: Los Angeles County.

Food Poisoning

2 cases: Monterey.

Undulant Fever

4 cases: Long Beach 1, Los Angeles 1, San Marino 1, Lynwood 1.

Tularemia

One case: Los Angeles County.

Coccidioidal Granuloma

3 cases: Oakland 1, Sacramento 2.

Septic Sore Throat

One case: Salinas.

Epilepsy

31 cases: Los Angeles County 2, Inglewood 1, Los Angeles 12, Santa Monica 1, San Bernardino County 1, Colton 1, San Francisco 6, San Joaquin County 1, Stockton 1, San Mateo 1, Sonoma County 4.

Rabies (Animal)

5 cases: Los Angeles County 1, El Segundo 1, Los Angeles 1, Riverside 1, Oxnard 1.

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* Cases charged to "California" represent patients ill before entering the State or those who contracted their illness traveling about the State throughout the incubation period of the disease. These cases are not chargeable to any one locality.

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